Deepak Ravikumar

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Objective

I am a Ph.D. candidate and I focus on deep learning robustness and security, specifically on out-of-distribution, adversarial deep learning, and memorization. I am looking to secure an internship starting sometime between Jan – July 2024.

Education

PhD, ECE, Purdue University
Jun '19 – Dec '24 (Expected)
Advisor: Prof. Kaushik Roy

MS, ECE, Purdue University
Aug '17 – May '19 | 4.0 / 4.0

BE (Bronze Medal), ECE,
MS Ramaiah Inst. Of Tech.
Aug '12 – Jun '16 | 9.74 / 10.0

Relevant Coursework
• Deep Learning
• Introduction to Neural Nets
• Machine Learning
• Computational Models and Methods (Algorithms)
• Convex and Stochastic Optimization
• Prog. Parallel Machines

Key Skills

Research, System Design, Prototyping, Debugging and Problem Solving

Programming

Strengths
• Python • C • Pytorch • Debugging
• VS Code • Version control (git)

Familiar
• C# • C++ • NodeJS • Docker
• Spark • CSS • React • Java
• JavaScript • Verilog • WPF • HTML
• gdb • Memory and Performance Profiling

Experience

Purdue University | Research Assistant, Lecturer and Teaching Asst.
Jan 2018 – Present, West Lafayette, IN

- Researched *Deep Learning* security and robustness, specifically out-of-distribution detection, adversarial attacks and memorization in deep neural nets.
- Researched, developed, and deployed their *web-infrastructure* using a *deep neural net pipeline* for real time fault detection in collaboration with a *startup* using React, Docker, NodeJS and Apache. Solved their need for remote data acquisition and analytics.
- Was the teaching faculty for *Advanced C Programming* (ECE 264, Summer '18) and VLSI Design (Fall '20). Handled labs on *Microprocessor System Design (ECE 362)*.

Microsoft Corporation | Machine Learning Intern
May 2022 – August 2022, Redmond, WA

- Researched and deployed Time Series Machine Learning model and pipeline for forecasting Azure Spark usage patterns using python and Cosmos DB. *Filed for a patent on the findings.* The deployed model saved several million dollars in running costs for the team.

National Instruments R & D | Software Engineer
Jun 2016 - Jul 2017, Bangalore, KA

- Developed new capabilities and added features to a high precision data acquisition tool and its infrastructure using WPF and .NET.
- Improved product performance (improved latency and removed memory leaks) and developed an onboarding program to train interns and new hires on the software and hardware infrastructure.

National Instruments R & D | Software Engineering Intern
Jan 2016 - Jun 2016, Bangalore, KA

- Prototyped new features for NI's high precision measurement tools and pushed code into production.

Selected Publications

- Deepak Ravikumar, Efstathia Soufleri, Abolfazl Hashemi, Kaushik Roy, *"Linking Differential Privacy, Memorization and Input Loss Curvature*" preprint 2023.
- Isha Garg, Deepak Ravikumar, Kaushik Roy, "*Memorization Through the Lens of Curvature of Loss Function Around Samples*". Under review at ICLR
- Deepak Ravikumar, Kaushik Roy, "*Norm Scaling for Out-of-distribution detection*" preprint 2023.
- Deepak Ravikumar, Alex Yeo, Yiwen Zhu, et al., "*Proactive Resource Provisioning in Large-scale Cloud Service [Scalable Data Science]*" under review at VLDB 2024.
- Deepak Ravikumar, Gobinda Saha, Sai Aparna Aketi, Kaushik Roy, "*Homogenizing Non-IID datasets via In-Distribution Knowledge Distillation for Decentralized Learning*", Under review at AAAI-24.
- Deepak Ravikumar, Sangamesh Kodge, Isha Garg, Kaushik Roy, "*Intra-Class Mixup for Out-of-Distribution Detection*". IEEE Access, pp. 25968-25981, Volume 11, 2023.
- Deepak Ravikumar, Sangamesh Kodge, Isha Garg, Kaushik Roy, "*TREND: Transferability based Robust ENsemble Design*". IEEE Transactions on Artificial Intelligence, 2022.

Updated 19-Nov 2023